

### **REMARKS**

In the Office Action, the Examiner rejected claims 1-10, 13-17 and 19. By this paper, Applicant has cancelled claim 3. Upon entry of the amendment, claims 1-2, 4-10, 13-17 and 19-35 will be pending, with claims 1-2, 4-10, 13-17 and 19 currently being examined. Applicant requests reconsideration and allowance of these claims in light of following remarks.

#### **Rejections Under 35 U.S.C. § 112**

The Examiner rejected Claim 3 under 35 U.S.C. §112, second paragraph, as being indefinite because the specification, while being enabling for a mole fraction of hydrogen in the anode exhaust stream between 0.1 and 0.5 does not reasonably provide enablement for having a mole fraction of hydrogen in the anode exhaust higher than 0.5. Applicant has cancelled claim 3, and hence the rejection is moot.

#### **Rebuttal of Examiner's Response to Arguments**

The Examiner characterized the Applicant's argument as being that Farooque teaches using steam and unspent fuel to drive a turbo compressor. In fact, Applicant observes that this is clearly not the case, and had no intention to argue such. Rather, Farooque is very clear that it is steam that drives the turbo compressor, and that hydrogen from the recovery device 8 is *then combined with steam* in line 15 for passage back to the gasifier 5. That is, although certain constituents are separated from the hydrogen in the hydrogen separation and recovery device 8 of Farooque, it is exceedingly clear that this hydrogen is then combined with steam that was used to drive the turbo compressor.

On page 9 of the Office Action, still in the Examiner's Response to Arguments, the Examiner indicated that "the steam of the turbo compressor [of Farooque] is then combined with the hydrogen supply line for the fuel cell, same as applicant". Applicant does not entirely understand this statement. In particular, it is clear from the recitations of claim 1 that the recycle stream of the invention which is at least a portion of the anode

exhaust stream is recycled back to the anode inlet after separation of hydrogen, carbon monoxide, carbon dioxide, unreactive fuel *and water*. *This would appear to be exactly the opposite* of the teachings of Farooque.

The Examiner went on to observe that Nakamura teaches recovering water from either or both the anode exhaust and the cathode exhaust. Be it as it may, the point is that Farooque teaches combining isolated or separated hydrogen with steam for recirculation. It is this recombination with steam that claim 1 specifically excludes. Thus, it is the Applicant's position that the combination of water recovery from Nakamura with the technique taught by Farooque would nevertheless recombine the steam of Farooque, downstream of the turbo compressor with hydrogen. Nakamura does no more than teach the separation of water from the hydrogen, as Farooque itself does within the separation unit 8. However, Farooque then, once again, recombines this hydrogen with steam downstream of the turbo compressor.

Applicant further notes that the Examiner essentially did not at all address the arguments regarding the combination of Ukai with Take and Nakamura. Rather, the Examiner simply observed that obviousness rejections cannot be rebutted on the basis of arguing individual references alone. To be clear, it is not Applicant's position that the references do not, in and of themselves and separately, fail to anticipate or make obvious the claimed invention. However, it is Applicant's position that the references, in combination, do not support a *prima facie* case of obviousness.

### **Rejections Under 35 U.S.C. § 103**

The Examiner rejected claims 1, 3-9, 15 and 19 under 35 U.S.C. § 103 (a) as being unpatentable over Farooque (U.S. Patent No. 5,084,362, hereinafter "Farooque") in view of Nakamura et al. (U.S. Patent No. 7,052,790, hereinafter "Nakamura").

The Examiner further rejected claims 1-4, 6-8, 10, 15, 17 and 19 under 35 U.S.C. § 103 (a) as being unpatentable over Ukai et al. (U.S. Publication No. 2003/0035983, hereinafter “Ukai”) in view of Take (U.S. Publication No. 2004/0229092, hereinafter “Take”) and Nakamura.

The Examiner rejected claims 13-14 and 16 under 35 U.S.C. § 103 (a) as being unpatentable over Farooque and Nakamura in further view of Sridhar et al. (U.S. Publication No. 2004/0202914, hereinafter “Sridhar”).

Claims 13 and 14 were further rejected under 35 U.S.C. § 103 (a) as being unpatentable over Ukai and Take in further view of Sridhar.

**Rejections of independent claim 1 over Farooque in view of Nakamura.**

Independent claim 1 recites, *inter alia* “a recycle stream in which a recycle stream in which at least a portion of the anode exhaust stream is recycled back to the anode inlet after separation of hydrogen, carbon monoxide, carbon dioxide, unreacted fuel and water”.

As summarized above, Farooque teaches combining the anode exhaust with steam 17, and sending this steam and hydrogen mixture to a gasifier 5.

The secondary reference, Nakamura, does not provide any solution to obviate this deficiency in Farooque. Specifically, Nakamura teaches a fuel cell system with condensers to cool anode side and cathode side exhaust. No exhaust, however is recirculated in Namakura. The mere fact that Nakamura removes water vapor or performs a condensation operation is insufficient to suggest that any unspent fuel could or should be recirculated back to the anode inlet.

Applicant notes that Farooque teaches that the hydrogen separation and recovery device 8 separates and recovers unspent hydrogen in the exhaust stream from other constituents. Even if these constituents included water or water vapor, the reference specifically teaches recombining the hydrogen with steam downstream of the turbo compressor, as noted above. It would appear that the Examiner would have a water vapor removal device placed downstream of the turbo compressor of Farooque, that is, in line 15 of the reference. That is, the Examiner would place the water removal device of Nakamura in the very line in which Farooque had just combined unspent hydrogen with steam used to drive the turbo compressor. This is entirely unsupported by either reference, and is, in fact, contrary to the very teachings of Farooque.

Accordingly, Applicant contends that the combination of references is simply inconsistent with both references, and cannot be used as the basis to support a *prima facie* case of obviousness. Accordingly, because no *prima facie* case of obviousness has been made out against at least in independent claim 1, Applicant would request reconsideration and allowance of this claim along with its dependent claims.

**Rejections of independent claim 1 over Ukai in view of Take and Nakamura.**

Beginning on page 5 of the Office Action, the Examiner formulated another rejection of the claims in view of a combination of Ukai, Take and Nakamura. Of particular interest is that fact that the Examiner did not even argue that the primary reference, Ukai, teaches the claimed recycle stream. Upon close observation, Applicant notes that Ukai does not teach such a recirculation stream. That is, in certain embodiments, residual fuel gas from the fuel cell 1 of Ukai is recaptured, but this recaptured gas is burned. That is, as illustrated in FIGS. 1 and 2 of the reference, for example, the residual fuel gas is returned to a burner 7 that is used to generate hydrogen. However, this residual fuel gas is not purified or separated, and is certainly not returned to the anode inlet.

Just as importantly, the Examiner did not argue that Take teaches such recirculation. Rather, the Examiner simply argued that Take discloses a fuel cell system comprising a hydrogen separator. It is unclear how the Examiner would have included Nakamura in this combination to read on the invention of claim 1. At the bottom of page 6 of the Office Action, for example, the Examiner argued that Nakamura teaches a fuel cell system in which water vapor is removed from exhaust gasses. Even if this were the case, this would not teach the recycling of hydrogen following separation of hydrogen, carbon monoxide, carbon dioxide, unreactive fuel and water as recited in claim 1.

Simply based upon the faulty and inadequate formulation of the rejection, Applicant submits that a *prima facie* case of obviousness had not been made out by the Examiner based upon the combination of Ukai, Take and Nakamura. Claim 1 is therefore believed to be clearly allowable over any combination of these references. The claims depending from claim 1 are believed to be equally allowable by virtue of their dependency from an allowable base claim.

In certain further rejections, the Examiner included Sridhar in the proposed combination. However, Applicants here again note that Sridhar does nothing to obviate the deficiencies of the other references as regards the establishment of a *prima facie* case of obviousness against claim 1, nor did the Examiner apply the reference properly to do so.

Reconsideration and allowance of all pending claims on this second basis are therefore requested.

**Conclusion**

Applicant respectfully submits that all pending claims should be in condition for allowance. However, if the Examiner believes certain amendments are necessary to clarify the present claims or if the Examiner wishes to resolve any other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

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/Patrick S. Yoder/

Patrick S. Yoder  
Reg. No. 37,479  
FLETCHER YODER  
P.O. Box 692289  
Houston, TX 77269-2289  
(281) 970-4545